Earth & Environmental Sciences Division

News, Views & EEScience

Disclaimer: this monthly update is intended for internal distribution within the Earth and Environmental Sciences Division at Los Alamos National Laboratory and must not be distributed outside of LANL.

Safety

A Message from Jeff

Jeff Hansen, Division ES&H Officer, 667-5043, jchansen@lanl.gov

Fieldwork – What happens if someone doesn't check back in from doing fieldwork?

Fieldwork is work that takes place outside of established Los Alamos' laboratories or offices. Typically for EES Division, this usually means outdoors, away from established areas, and where other employees are not present to render aid or assistance when needed. There usually are no emergency alarms, or in many cases, reliable communications to call for help. The check out to do field work, communication of changes, and the check back in from doing fieldwork is crucial to the safety of our people.

In general, for field work done on Los Alamos' property, the point of contact must notify EM&R (7-6211) and their line manager to report a missing field team or team member. For fieldwork not on Los Alamos' property but inside New Mexico, the missing field workers must be reported to the New Mexico State Police and the point of contact's line manager. A courtesy call to EM&R is recommended also. For work done outside of the state or the country, the specific Hazard Control Plan must address the issue.

It is vital that the work location is identified in any fieldwork for obvious reasons. Changes are frequently necessary and communication is very important. If someone fails to check back from his or her fieldwork and we can't find him or her, we have no choice but to declare an emergency. When workers forget or are too busy to make the necessary contacts, we have major problems. There can be major expenses involved for false alarms and unnecessary searches. I am not aware of any false emergency searches in the division yet but I am aware that we did have one successful recovery when a check back from the field was not received. If our people are injured or incapacitated while doing fieldwork they must know we are going to be coming for them.

Security

An Ear on the LIR from Tony

Tony Montoya, Acting Division Security Officer (DSO), 7-8065, antonio@lanl.gov.

Beginning, Monday, June 9-20, 2003, The NNSA Los Alamos Site Office will conduct their annual Safeguards and Security Survey of LANL. Remember, if you don't know the answer to a question, you have resources (OCSR, CDC, LIRs, etc.).

http://intees.lanl.gov/eesdo/doclosed_access/security_reps.shtml

If your training in any required course has expired, please take it before June 9th.

More on Training from Paul

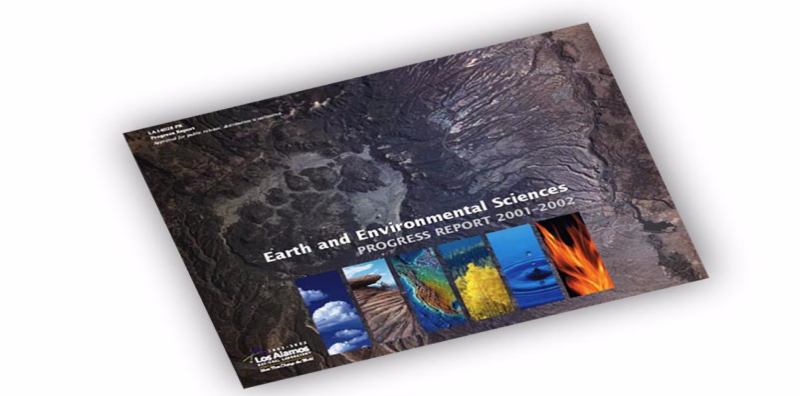
KUDOS to EES-6 and EES-7 for reaching the 99 percent complete mark on Training! Well-done! (At the other end of the scale, respectively: EES-12 at 93 percent,

EES-2 and EES-9 at 94 percent, and EES-11 at 95 percent.)

Welcome, Roger Prueitt, EES-9!

GISLab has a new team member, Roger Prueitt; he is located in building TA-3/215, Room 259. Roger is an archaeologist by training and has extensive experience in cartography. Roger's e-mail address is rprueitt@lanl.gov and his phone number is 665-2807. Feel free to contact Roger for any mapping or GIS needs you may have.

The NEW **2001-2002 EES Progress Report** is now available in hard copy. You may receive a copy or copies from your group offices. Group Leaders and Program Managers should send or give copies to their sponsors, colleagues, etc. The Progress Report is also available on-line @ http://www.ees.lanl.gov/pr



Open Computing!

The Lambda and Theta computers now have an additional 1.5TB file system available exclusively for EES users. You may get access by talking to Lynn McDonald. Also, the Lambda machine has a lot of excess capacity right now and it is free to EES users!

Workshop planned for September:

The first international workshop on "Bridging nonliving and living matter" will be held on September 9-11, 2003. The first day is hosted by Los Alamos with tutorial presentations about the different approaches to the assembly and evolution of protocells. The Santa Fe Institute will host days two and three with more technical workshops on the detailed problems associated with the assembly of protocells. The workshop is free and we particularly encourage participation in the first day's lectures at LANL. This workshop is cosponsored by Center for Space Science and Exploration (LANL) and the Santa Fe Institute (SFI) and one of our goals with this cosponsorship is to integrate the scientific communities at Los Alamos and SFI within this exciting new area of complex systems situated between geosciences, material science, chemistry, and biology. In addition, we hope to have NASA's Astrobiology Institute cosponsor this event. The organizer of the workshop are:
Steen Rasmussen, EES-6, (point of contact); Liaohai Chen, Bioscience, Argonne National Laboratory; David Deamer, Chemistry, UC Santa Cruz; Peter Stadler, University of Leipzig, Germany; David Krakauer, Santa Fe Institute; and Norman Packard, Prediction Company.

Update on Urban Security

Some new publications that originated under the "Urban Security Project":
Daniel Yamins, Steen Rasmussen, and David Fogel: "Growing urban roads, "Networks and Spatial Economics, 3, 1, pp 69-85 2003;

Martin Nilsson, Steen Rasmussen, Bernd Mayer, and David Whitten: "Constructive molecular dynamics lattice gasses: 3-D molecular self-assembly" in New constructions

in cellular automata, Eds. D. Griffeath and C. Moore, Oxford University Press, pp 183-210 (2003); and

Articles and cover graphics in MIT Artificial Life Journal: "Ansatz for Dynamical Hierarchies" Pages 329-353 Steen Rasmussen, Nils A. Baas, Bernd Mayer, Martin Nilsson and Michael W. Olesen (followed by: "Is It the Right Ansatz?" pp 355-365; and Dominique Gross and Barry McMullin, "Defense of the Ansatz for Dynamical Hierarchies," pp 367-373.

Management Walk Arounds for May

I walked the spaces in and around SM-40 complex, and met with several staffers who were around on a couple of Friday afternoons. (No meetings, so a great time for me to wander around.)

On May 22, I walked the path that we are planning on taking Director Pete Nanos when he comes on June 10 for his management walk around and All Hands meeting with EES Division. The MWA will begin at 1:00 in the TA-3/40 area (including 1516); we will walk the basement area of the east and south wing of SM 40 (S10-Seismic Network Station); tour the "former thin section lab"; walk to 494 (the Geochemistry and Geology Research Laboratory); and we will walk the area of the EES-2 and EES-11 transportables where we will tour the Dynamic Stress Laboratory and the Non-Linear Elastic Laboratory in 473, EES-11's area. We are disappointed that we do not have more time, as we would like to have toured TA-48 and TA-51. We will finally walk to TA-3/43, third floor; and we will end up in the Main Auditorium of SM 43 for our EES "All Hands with Pete Nanos." If for some reason we are unable to get permission to have the security in the auditorium moved back for the meeting, we will make arrangements for those without badges and for our foreign nationals to view the session.

In addition, *Craig Pearson* offered to present any questions that anyone wants asked, anonymously or otherwise, to Pete at the meeting. Please send your questions directly to Craig @ cpearson@lanl.gov. Also, please feel free to ask your questions openly and in person during the EES all hands.

Service Anniversaries & Congratulations to the Following:

Lynn McDonald, EES-DO, 20 years
Craig Pearson, EES-11, 10 years
Danny Katman, EES-9, 5 years
Paul Rich, EES-9, 5 years

News from the Science and Engineering Leadership Team

Manvendra Dubey, Chair,
5-3128, dubey@lanl.gov

Over the past month the SELT continued its program development activities, has informed management and the Division Review Committee on TSM issues, championed EES participation and representation in technical panels, and enhanced communications. The new SELT has hit the floor running and has taken up important new initiatives for EES.

The SELT in partnership with EES's homeland security contacts convened an division wide meeting to inform staff and strategically assess and leverage EES's expertise in this emerging area. This meeting initiated valuable

exchange between EES contacts and our technical staff. Technical input in targeted areas was solicited and received from EES staff. With this preparation we hosted a meeting with Sarah Scott, the Associate Director for Rad/Nuc to gain information on the program needs and also provide her information on EES-staff and their relevant expertise. This was Sarah's second visit to EES. It was recognized that CHS funding and priorities are in a state of flux in DC. The need to be aware of the changing priorities, constant participation in working groups, and readiness to respond to a quick call were underscored. EES is broaching this program proactively, and many staff are now listed as leads for specific tasks in many LANL working groups. The SELT plans to use input provided by the technical staff to develop a compendium of EES expertise to strengthen our role in the emerging CHS programs.

The SELT drafted a report " A TSM perspective on the Laboratory's business systems and other systemic institutional issues" for Pete Nanos. This report that was based on input provided by EES TSMs has been shared with the Division leadership, and is in the process of being honed for submission.

The SELT delivered its annual progress and ongoing issues report to the Division Review Committee that is posted on the SELT web. The new and old members had a working lunch with the DRC. While several funding and technical issues were discussed, the issue of UC contract appeared to leap out in our discussions. The DRC and our UC-contact, have asked the SELT to provide some follow up data to quantify the value of UC as a contractor. The SELT has begun this exercise with a staff survey on questions pertaining this issue and potential future contractors. The response from EES staff has been exceptionally strong (more than 102 responses to date). We also plan to quantify the number of LANL staff with degrees, postdoc tenures, faculty jobs, or affiliations with UC, as well as numbers of papers with joint LANL-UC authors over the past 7 years. These data and analysis will be incorporated in the report that will be delivered to the DRC, and will be shared with our management.

The SELT thanks Paul Weber for his leadership and championship of EES, and wishes him the best on his new assignment as Deputy Associate Director of the TR Directorate. The SELT will be working closely with our new Acting Division Leader Terry Wallace and the Acting Deputy Division Leader Craig Pearson to help ensure an effective transition that preserves and builds upon the progress we have made.

Weekly Highlights / Accomplishments sent to ADSR

2003 Pollution Prevention Awards Go to Los Alamos' Stone and McLin

The Prevention Program of the Risk Reduction Environmental Stewardship Division (RRES-PP) at Los Alamos National Laboratory awarded an "outstanding" nomination award for the 2003 Pollution Prevention (P2) to a team from RRES and the Earth and Environmental Sciences Division (EES). **William Stone**, EES, and Stephen McLin, RRES, were presented certificates for their work, "Aquifer Testing at Municipal Supply Well PM-2," on May 7, 2003. The award recognized water conservation measures that were developed and implemented during the aquifer test at municipal water supply well, PM-2, where more than 45 million gallons of water were successfully salvaged.

To conduct this test, normal water production at most municipal supply wells was terminated beginning in early December 2002. In addition, the combined 40 million gallon storage capacity of Los Alamos County and the Laboratory was slowly depleted and in February

2003, and a constant-rate pumping test at well PM-2 was started. The PM-2 well yielded about 1,250 gallons per minutes for 25 continuous days. Typically, production waters must be discharged to the environment under applicable federal / state permits during an aquifer test because of insufficient storage capacity. In this case, production waters were directed into numerous storage tanks located throughout Los Alamos County and Laboratory facilities where it could be eventually used. During the test period, no interruptions in water services were reported and no water discharges in the environment occurred. The operations required extensive planning and close coordination with Stone and McLin and the Los Alamos County Utilities Department for equipment operations and access to the Los Alamos wells.

Los Alamos' Staff Member Named to New Mexico State Board

Paul Rich, of Los Alamos' Earth and Environmental Sciences Division, was recently asked by the Board of Advisors at New Mexico State University in Las Cruces, New Mexico to serve on the Board of Advisors for the Institute of Natural Resource Analysis and Management (INRAM). INRAM is funded by a three-year, five million dollar grant from the National Science Foundation and the state universities of New Mexico. The Board just completed its first year of work and has many exciting prospects for the future. The INRAM is currently preparing a response to a review from the American Association for the Advancement of Science.

Los Alamos Scientists to Submit New Seismic Migration and Imaging Work Abstracts for the Society of Exploration Geophysicists (SEG) Meeting

Seismologists from the Earth and Environmental Sciences Division, Doug Alde, Mike Fehler, Cory Hoelting, Leigh House, Lianjie Huang, and Hongchuan Sun submitted a total of six expanded abstracts to the 2003 Annual Meeting of the Society of Exploration Geophysicists (SEG). The SEG annual meeting is the largest professional meeting devoted to exploration geophysics. Each of the Los Alamos abstracts describe a new and slightly different approach for carrying out seismic migration, or "imaging," to obtain a better view of the subsurface. The new methods contribute to significantly improving the accuracy and reliability of seismic imaging, particularly from areas that are difficult to image using existing methods. Some of the new imaging methods are being developed in collaboration with oil industry researchers and are already being used by the industry collaborators.

Los Alamos Leads the Science in Micro-Hole Drilling Technology

Over 50 technical experts from the oil and gas industry, oil field technical services, and various university and DOE subcontractors, along with DOE and Los Alamos personnel, met in Albuquerque on April 29-30 to prepare a "Roadmap" for a National Initiative in micro-hole technology slated to begin in fiscal year 04. Micro hole technology is a miniaturized version of conventional drilling technology developed for the purpose of obtaining subsurface data. Very substantial cost savings and improved data quality is expected using micro boreholes for deep access and interrogation of the subsurface. Central to the discussions was a review of Los Alamos' progress in micro-hole technology and a list of critical requirements prepared by Los Alamos for advancing the technology. Los Alamos, the originator and lead organization for the project, also exhibited its coiled-tubing micro hole drilling system and miniaturized borehole instrumentation that were adapted and miniaturized under Los Alamos' leadership
Los Alamos employees and contractors who contributed to the review and meeting were

David Anderson, Don Dreesen, Jim Thomson, Tom Fairbanks, and Jim Albright all of the Earth and Environmental Sciences Division.

Yucca Mountain, Nevada Tours Nevada Officials and Nez Perce Tribe

Dick Kovach of the Earth and Environmental Sciences Division's Yucca Mountain Project continues to host tours for interested public officials and media. On April 28, Bruce Reinert toured David Bert, Radio Talk Show Host of KNPR (Las Vegas Public Radio Station) and the following Churchill County, Nevada Officials: Ronald Flores, Superintendent, Churchill Co. School District; Tom Stockard, Chief Deputy, District Attorney; Valerie Serpa, Director, Churchill Arts Council; Mark Feest, Deputy District Attorney; Eleanor Lockwood, Planning Director, Terri Pereira, Assistant Planning Director; and John Tewell, Councilman, City of Fallon, Nevada.

Dick Kovach hosted a tour on April 29 for members of the Nez Perce Tribe located in north-central Idaho; the tribe officials represented Nez Perce's Environmental Waste Management and Restoration Program. Interested officials from the tribe included: Patrick Sobotta, Director; Dan Landeen, Environmental Specialist; John Stanfill, Environmental Health Specialist; Sandra Lilligren, Environmental; Kristie Baptiste-Eke, Environmental Policy Analyst; and Gabe Bohnee, Environmental Specialist. Also attending the tour was a reporter from 60 Minutes (no cameras) and eight individuals from the DOE-Wide Scientific and Technical Information Program.

Los Alamos Geophysicist, Peter Roberts, Recognized for Work on Enhanced Oil Recovery

An article titled, "Elastic Wave Stimulation of Oil Reservoirs: Promising EOR Technology?" that was authored by Peter Roberts, a geophysicist in the Earth and Environmental Science Division, along with Igor Esipov of Gubkin State University in Moscow, Russia and Ernest Majer of Lawrence Berkeley Laboratory (LBNL), was published in the May 2003 issue of "The Leading Edge", which is the monthly magazine of the Society of Exploration Geophysicists. The article describes the current state of seismic stimulation research, knowledge and technology development related to enhanced oil recovery (EOR). Examples of research results from Los Alamos, Russia and LBNL are included, as well as a brief description of an international conference on the subject held last year in Moscow. The article, which was invited by the Leading Edge Editorial Board, represents a milestone in that the exploration geophysics community is gaining interest in this controversial subject. Roberts helped initiate this work at Los Alamos eleven years ago and Los Alamos was the first US research organization to work in this exciting and innovative area of science. Roberts was the co-organizer of the conference and the expanded abstracts can be downloaded at http://www.ees.lanl.gov/Resources/dssl.shtml.

Los Alamos Earth and Environmental Sciences Division Participates in Annual Seismological Society Meeting in Puerto Rico

The annual meeting of the Seismological Society of America was held in San Juan, Puerto Rico April 28 - May 2, 2003. Attendees from the Earth and Environmental Sciences Division's Geophysics group were Monica Maceira, Marie Renwald, Steven R. Taylor, David Yang, and Michael Fehler.

Technical Talks coauthored by Los Alamos staff included:

Maceira, M. and S. R. Taylor, Short-period Surface-wave Tomography in Central Asia and Its Application to Seismic Discrimination;

Renwald, M. S. R. Taylor, and T. C. Wallace, Calibrating the MKAR ARray Using Transfer Functions;

Rowe, C.A., R. A. White, and C. H. Thurber, Precise, Correlation-based Seismic Event Locations at Soufriere Hills Volcano: Insights into Magma Extrusion Behavior through Detailed Mapping of Seismic Energy Release;

Wiemer, S., and C. Rowe, Monitoring Temporal and Spatial Variations in the Frequency-magnitude Distributions of Micro earthquakes: An Emerging Capability in Volcanoseismology?; and

Yang, X., H.J. Patton, and S.R. Taylor, 20-sec Rayleigh-wave Attenuation Tomography for Central Asia.

Editor-in-Chief of Bulletin of the Seismological Society Reports Activities

Michael Fehler of the Earth and Environmental Sciences Division attended the meeting of the Society Publication Committee and discussed issues related to the Society's Journal, the Bulletin of the Seismological Society of America (BSSA); he also attended the Society Board meeting and reported on his activities as Editor-in-Chief of the Bulletin. Fehler was also responsible for managing a meeting of the BSSA Board of Editors. Fehler is completing his eighth year as Editor of the Bulletin. At the meeting he announced his plans to step down as Editor-in-Chief of the Bulletin.

In addition, Fehler co authored a paper with the citation below that was published in the February, 2003 issue of the Bulletin of the Seismological Society of America: Saito, T., H. Sato, M. Fehler, and M. Ohtake, "Simulating the envelope of scalar waves in 2-D random media having power-law spectra of velocity fluctuation", Bull. Seismol Soc. Am. 93, 240-252, 2003.

Fehler's coauthors are all from Tohoku University in Sendai Japan. The paper describes numerical and theoretical modeling of wave propagation in heterogeneous random media that are appropriate representations of the Earth. The theoretical modeling combines the use of a modification of the Radiative Transfer Theory to model strong isotropic multiple scattering along with a Markov approach to incorporate strong forward scattering. The theoretical model is the first ever presented that can explain both the formation of seismic coda and the complexity of the initial arrival packet of seismic energy from earthquakes. The model helps us better understand seismic wave propagation in realistic earth models, which is important for estimation of damaging ground motion from large earthquakes and estimating sizes of explosions and earthquakes.

Members of Los Alamos' Ground-Based Nuclear Explosion Monitoring Team Publish China Earthquake Findings

Members of the Los Alamos Earth and Environmental Science Division's Ground-Based Nuclear Explosion Monitoring Team (GNEM), Aaron Velasco (formerly of Los Alamos and now at University of Texas – El Paso), Hans Hartse, and George Randall recently had the paper, "Propagation or source? Analysis of a moderate magnitude seismic event in the Quinghai province, China," accepted for publication in the Bulletin of the Seismological Society of America.

The paper focuses on an earthquake that occurred in December 1997, which had some attributes of an explosive event on some short-period, body-wave discrimination plots. Through modeling of long-period surface waves, the authors confirm that the event is indeed an earthquake. They found that path effects through the Tibetan region, focal mechanism, and possibly rupture directivity contributed to the "explosion-like" characteristics of the short-period body waves.

Los Alamos Seismologist Contributes to Memphis, Tennessee Earthquake-Resistant Construction Decisions

The federal government is now urging parts of the Midwest to adopt a new building code that would make buildings as earthquake resistant as those in southern California. A new study by seismologist Seth Stein of Northwestern, Joseph Tomasello, structural engineer at the Reaves Firm in Memphis, Tennessee, and Andrew Newman, a seismologist at the Los Alamos National Laboratory in New Mexico, appeared in the May 13 issue of Eos, which is published by the American Geophysical Union. The researchers' work shows that the prescribed measures for the Midwest's New Madrid seismic zone (NMSZ) would cost far more than the damage prevented. The New Madrid seismic zone includes parts of Tennessee, Kentucky, Missouri, Arkansas, Illinois, Indiana, and Mississippi. "We need to learn more about earthquakes in the Midwest, but we already know that New Madrid and California are very different earthquake problems," said Stein, whose measurements in the NMSZ using the Global Positioning System indicate that the ground is moving very slowly, if at all. "The hazard for New Madrid is significantly less than for California."

"Should Memphis Build for California's Earthquakes," appears in Eos, Volume 84, number 19 (13 May 2003), page 177. Reporters and public information officers of educational and scientific institutions may obtain a pdf copy of the Stein et al. article from Emily Crum: ecrum@agu.org For results of Northwestern's study of the New Madrid seismic zone, go to http://www.earth.northwestern.edu/people/seth/research/nmsz.html

Underground Test Area's Technical Working Group Selects Vice Chair from Los Alamos

Ward Hawkins, a geophysicist at Los Alamos' Earth and Environmental Sciences Division, was recently selected as vice-chairman of the Underground Test Area (UGTA) Environmental Restoration project's Technical Working Group (TWG) for fiscal year 2004. The TWG provides technical advice and recommendations to the DOE's National Nuclear Security Administration, Nevada Support Office UGTA Project Manager. The TWG evaluates and recommends scientific and technical studies that promote the effective closure of Corrective Actions Units on the Nevada Test Site. These recommendations assist the DOE in strategic long-term planning of data collection and analysis activities.

Imaging Hydraulic Fracture Using Micro-Earthquakes Published by Los Alamos Seismologists

Jim Rutledge and Scott Phillips of Los Alamos' Earth and Environmental Sciences Division recently published a paper issued in Geophysics: Rutledge, J.T., and Phillips, W.S., 2003, Hydraulic stimulation of natural fractures as revealed by induced micro-earthquakes, Carthage Cotton Valley gas field, east Texas, Geophysics, 68, 441-452.

In the paper they present an improvement in imaging a hydraulic fracture using micro-earthquakes induced in an east-Texas, tight-gas sand reservoir. The improved image along with focal mechanism solutions indicates that the reservoir's known natural fracture system plays a significant role in controlling the treatment

Carlsbad, New Mexico to Host Radiochemistry Conference

The 2003 Radiochemistry Conference, sponsored by the Radiochemistry Society, will be held July 13-16, 2003, in Carlsbad, New Mexico (home of DOE's Waste Isolation Pilot Plant). The conference will include a one day Technical Workshop during Monday, July 14, on the subject of "Education in radiochemistry: an academic and a public prob-

lem", followed by technical sessions on Tuesday and Wednesday, July 15 & 16. Participants are encouraged to give oral or poster presentations. The abstract deadline is June 20, 2003. Details on the conference and workshop are posted at http://www.radiochemistry.org/rc_2003conference.html.

Yucca Mountain Tours Energy Reps, KCTS TV, Japanese Reps, and Sandia National Laboratory Reps

Bruce Reinert and Richard Kovach of the Earth & Environmental Sciences Division's Yucca Mountain Project (YMP) continue to provide tours that consist of a general briefing of the tunnel layout and experiments (both completed and ongoing) at Yucca Mountain, Nevada. The tours occur underground in a side drift from the main tunnel called an "alcove" that has been customized for public tours (including maps/displays and is about 200 yards underground). The following tours were conducted during May 5-17, 2003:

Representatives and the Director and Plant Manager, Tom Moulia, from Pacific Gas and Electric Citizens, Co.;

Representatives from Humboldt County, Nevada, California Energy Commission, and Home Power, Inc.;

Bill Nye the "Science Guy, " and his Executive Producer, Douglas Wilson, of KCTS, Public Television Seattle, Washington, and 40 individuals from State Maritime College, New York; and

Members of Sandia National Laboratories, Japan Nuclear Cycle Institute, several Japanese Universities, representatives from the Center for Korean-American Peace, Philippine Nuclear Research Institute, University of British Columbia, Vietnam Atomic Energy Commission, Japan Atomic Industrial Forum, and Kaye Hart, Counselor, Embassy of Australia; and

The DOE Facility Information Management System sent 70 representatives from DOE Sites across the country, Naval Air Special Weapons Facility Group, the Naval contingent on delivery systems during atmospheric testing at the Nevada Test Site; tours were also conducted for about 250 guests during the YMP Open House on May 17.

Winners of the April Mystery Image:

1st Place: Carl Gable, EES-6

No one else knew what this was???

It was the EES-11 Micro-Hole Coiled-Tubing Rig!

More About April's Mystery Image (below):

Jim Thomson, EES-11, is shown with the EES-11 Micro hole coiled-tubing drilling rig (foreground) that is capable of drilling 1 3/4-and 2 3/8-inch micro holes to 800 feet,

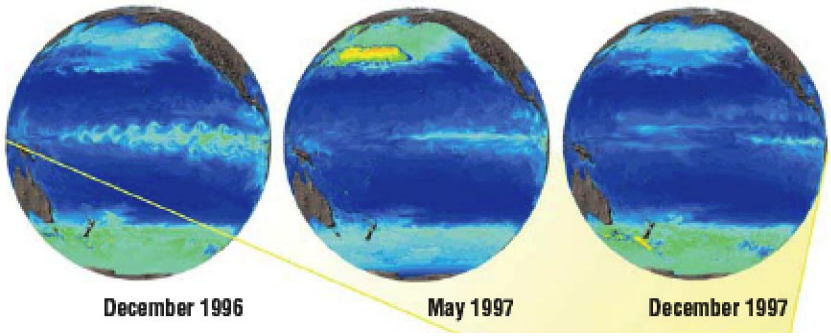
and the flatbed-mounted mud-conditioning system (blue instrument) is supporting drilling operations at San Ysidro, New Mexico.

Read more in the new 01-02 Progress Report, page 59, "Micro hole Drilling and Instrumentation Technology."

Dottie's Mystery Image for May (below): what kind of images are these?

- *Are these images of*
- *El Niño*
- *El Niño and La Niña*
- *La Niña*

Respond to: dot@lanl.gov?



EEScience

Guest Editorial

Should Memphis Build for California Style Earthquakes?

Seth Stein, Northwestern University
1 (847) 491-5265
or s-stein@northwestern.edu

Joseph Tomasello, Reaves Firm, Memphis, TN
joet@reavesfirm.com

Andrew Newman, EES-9
anewman@lanl.gov

WASHINGTON - The federal government is urging Memphis and other parts of the Midwest to adopt a new building code that would make buildings as earthquake resistant as those in southern California, where shaking is much more likely to seriously damage a building. A new study by researchers at Northwestern University, the Reaves Firm in Memphis, and Los Alamos National Laboratory finds that the prescribed measures for the Midwest's New Madrid seismic zone (NMSZ) would cost far more than the damage prevented. The New Madrid seismic zone includes parts of Tennessee, Kentucky, Missouri, Arkansas, Illinois, Indiana, and Mississippi.

The study, by seismologist Seth Stein of Northwestern, Joseph Tomasello, structural engineer at the Reaves Firm in Memphis, Tennessee, and Andrew Newman, a seismologist at the Los Alamos National Laboratory in New Mexico, appears in the May 13 issue of Eos, published by the American Geophysical Union. "We need to learn more about earthquakes in the Midwest, but we already know that New Madrid and California are very different earthquake problems," said Stein, whose measurements in the NMSZ using the Global Positioning System indicate that the ground is moving very slowly, if at all. "The hazard for New Madrid is significantly less than for California."

The question is how to protect Memphis and other areas from earthquakes. Earthquakes in the NMSZ are typically small and more a nuisance than a catastrophe. Still, large (low magnitude 7) earthquakes occurred in 1811 and 1812, and geological records suggest that similar or slightly smaller earthquakes occur about every 500 years. Memphis and many other

communities currently have building codes for earthquake-resistant construction. Now, states, counties and municipalities in the NMSZ are considering a much stronger code developed under the direction of the Federal Emergency Management Agency (FEMA). This code, IBC2000, would increase the earthquake resistance of new buildings to levels similar to those in southern California. The code would suggest the need to retrofit existing critical buildings, including schools, hospitals, fire and police stations, and infrastructure such as highways and bridges. "Surprisingly," said Stein, a professor of geological sciences, "the new code has been proposed with almost no consideration of the costs and benefits. We've looked at the numbers and they don't make economic sense." "They're not even close," said Tomasello, who has studied the costs of designing buildings with the new guidelines. "FEMA estimates that, averaged over hundreds of years, Memphis faces about $17 million in earthquake damage per year, which the new code might cut in half. "The problem is that since the Memphis metropolitan area has about $2 billion in construction each year, and the new code would raise costs about 10 percent, we'd be spending about $20 for every one dollar we'd save. On top of that, we would want to upgrade important existing buildings, costing 25 to 33 percent of the cost of a new building. The economic impact, including reduced new construction, job losses, and reduced housing affordability, is likely to be significant." Buildings in California are much more likely to be shaken seriously during their useful life of about 50 years. "FEMA accepts that; their estimate shows that the risk of earthquake damage in Memphis and St. Louis is about one-fifth to one-tenth of the risk in San Francisco and Los Angeles," said Stein. "Therefore we shouldn't use the same building strategy unless it's justified by careful analysis. If we think this through, we can probably do a lot better." "The bottom line," said Tomasello, "is not to rush into this." Instead, the study recommends that communities carefully consider the costs and benefits of alternative strategies and decide on a level of earthquake-resistant construction that makes political and economic sense. "I think that the proposed code illustrates the old line that every problem has an obvious, simple, solution -- and it's often wrong," said Stein. "Given the large sums at stake, time spent getting this right would be well spent."

Notes for journalists:

The article by Seth Stein, Joseph Tomasello, and Andrew Newman, "Should Memphis Build for California's Earthquakes," appears in Eos, Volume 84, number 19 (13 May 2003), page 177.

Reporters and public information officers of educational and scientific institutions may obtain a pdf copy of the Stein et al. article from Emily Crum: ecrum@agu.org

For results of Northwestern's study of the New Madrid seismic zone, go to http://www.earth.northwestern.edu/people/seth/research/nmsz.htm

A Final Note from Paul

As I thought about writing this segment many thoughts competed for attention. Indeed, I was tempted to go quietly until some fine people convinced me that it would be good to list a few specifics that stand out in my own mind. So, I tried to distill a top ten (I'm no competition for Dave Letterman and The Late Show!). My apologies for undoubtedly and inadvertently leaving out some items.

10. We have all lived through the operations turmoil of the last several months. The Division pulled together well, and many people responded quickly to numerous requests for (often duplicate) information. We came out looking good as a Division. In my opinion, the

best we can do to ensure our continued UC connections is to do our jobs as well as possible and show the detractors that we are first-class in everything we do.

9. The Next Steps Team worked with me constantly for many months to help draft the vision and mission and to define some areas of concern. The Next Steps Process and concomitant Division-wide engagement were very helpful in implementing and achieving several of the items reflected here. The Group Leaders heroically took leadership roles inculcating many changes (in addition to their near-impossible on-going jobs). Terry and Craig and Next Steps team are enthusiastic about continuing the process and staying on the path toward our vision: "To provide outstanding scientific and engineering leadership, and cost-effective research, development, and applications that benefit our Environment, Energy, and National Security."

8. The SELT took a leadership role in linking us with program managers, in improving our involvement in LDRD, in making connections across the Laboratory, and in communicating with many, many Division members.

7. We worked to get high, positive visibility with our Associate Director's office (ADSR) and higher offices; we succeeded in getting strong ADSR attention for program development, especially in Carbon and Water, as well as in Repository Science / Nuclear Technologies. We also succeeded in attracting very little negative ADSR attention to our Division operations because we took care of our people and operations.

6. We reduced costs; the division overhead rate is down 33 percent from planned rates since I arrived; and group rates are down considerably. We reduced our un (der) funded position to almost zero. We eliminated unused space and consolidated some other space, reducing space taxes. All of these make us much more competitive as we look for new and larger programs (we are still above Laboratory averages, but no longer the unenviable number one).

5. We are high on the list for a new building, and the Laboratory Director has agreed that third party financing should be pursued.

4. We integrated program functions into the Division to the point where we now have program responsibility for well over half of our work. Our program leaders are integrating collections of projects into portfolios, leveraging common interests, and interfacing well with the sponsors; this positions us well to provide ideas and products that meet the needs of our sponsors.

3. The publications rate increased dramatically and journal citations were up by about 50 percent in 2002!We have less than a dozen staff who are primarily engaged in R&D who were not authors on a paper in the past two years. We accomplished all of this in a funding climate where some of our sponsors needed to be reminded of the value of peer review and publications.

2. We are paying more attention to our people: no lost time accidents, no security incidents, and many more awards for outstanding contributions, including the Distinguished Performance Award for the Yucca Mountain Team, and the Fellows Prize for Giday Woldegabriel.

1. This has been a fun and exciting experience for me. I have learned a lot and have been privileged to work with outstanding people in EES. I especially want to thank all the Division members who volunteered to make the Division and the Laboratory a better place!

A **Farewell Reception**, in honor of Paul, will be held on June 4, 3-5 in the EES-DO Conference Room. All EES is invited to say farewell to Paul.

News, Views & EEScience:

A Monthly Newsletter from
Paul G. Weber, **EES Division Leader**
pweber@lanl.gov
7-3644

Additional information regarding this publication, please contact:

Dottie Austin, EES-DO, Editor/ Project Leader
dot@lanl.gov
7-3175